



## **From biogas to biorefinery: Modelling green chemical production in a full-scale anaerobic digester**

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From biogas to biorefinery: Modelling green chemical production in a full-scale anaerobic digester

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Abstract:  
Industrial waste streams are a versatile feedstock for biorefinery processes. In this work, we study the upgrading of such feedstock into butanol, a valuable chemical and promising biofuel. The Anaerobic Digestion Model No. 1 (ADM1) was extended with butanol-forming reactions, thermodynamics and butanol gas-liquid mass transfer. Continuous butanol production was modelled in a full-scale anaerobic digester. ADM1 without thermodynamic constraints overestimates butanol productivity by 121% as compared to the thermodynamics based implementation. The highest butanol productivity (2.6 MWh.d<sup>-1</sup>) was obtained at pH 5 with a COD recovery of 12%. Results lead us to propose a two-stage biorefinery process for butanol/methane production.